Fig. 1

Division options:
==========

1. 5
2. 4+1
3. 3+2
4. 3+1+1
5. 2+2+1
6. 2+1+1+1
7. 1+1+1+1+1

Fig. 2

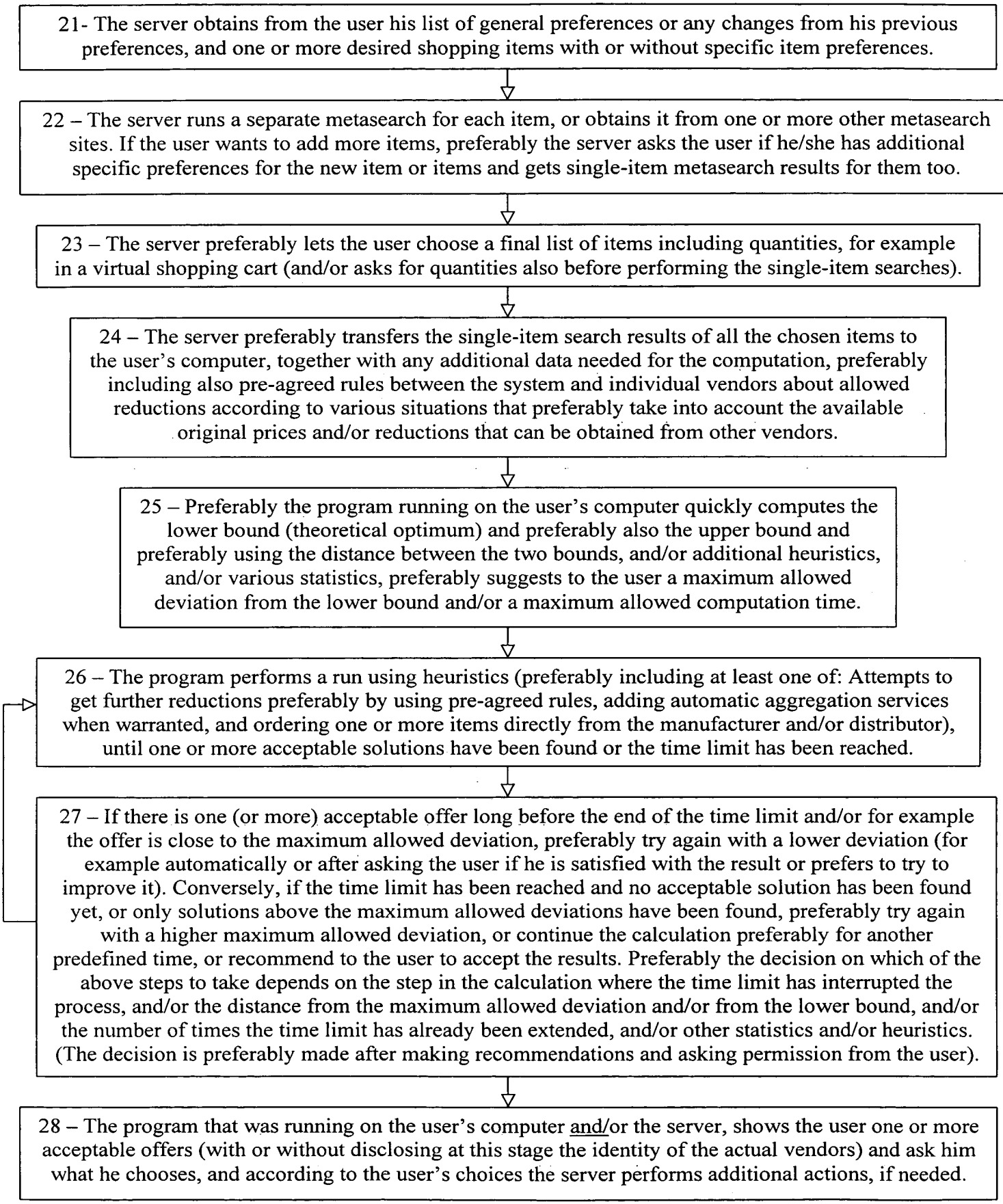

21- The server obtains from the user his list of general preferences or any changes from his previous preferences, and one or more desired shopping items with or without specific item preferences.
22 – The server runs a separate metasearch for each item, or obtains it from one or more other metasearch sites. If the user wants to add more items, preferably the server asks the user if he/she has additional specific preferences for the new item or items and gets single-item metasearch results for them too.
23 – The server preferably lets the user choose a final list of items including quantities, for example in a virtual shopping cart (and/or asks for quantities also before performing the single-item searches).
24 – The server preferably transfers the single-item search results of all the chosen items to the user's computer, together with any additional data needed for the computation, preferably including also pre-agreed rules between the system and individual vendors about allowed reductions according to various situations that preferably take into account the available original prices and/or reductions that can be obtained from other vendors.
25 – Preferably the program running on the user's computer quickly computes the lower bound (theoretical optimum) and preferably also the upper bound and preferably using the distance between the two bounds, and/or additional heuristics, and/or various statistics, preferably suggests to the user a maximum allowed deviation from the lower bound and/or a maximum allowed computation time.
26 – The program performs a run using heuristics (preferably including at least one of: Attempts to get further reductions preferably by using pre-agreed rules, adding automatic aggregation services when warranted, and ordering one or more items directly from the manufacturer and/or distributor), until one or more acceptable solutions have been found or the time limit has been reached.
27 – If there is one (or more) acceptable offer long before the end of the time limit and/or for example the offer is close to the maximum allowed deviation, preferably try again with a lower deviation (for example automatically or after asking the user if he is satisfied with the result or prefers to try to improve it). Conversely, if the time limit has been reached and no acceptable solution has been found yet, or only solutions above the maximum allowed deviations have been found, preferably try again with a higher maximum allowed deviation, or continue the calculation preferably for another predefined time, or recommend to the user to accept the results. Preferably the decision on which of the above steps to take depends on the step in the calculation where the time limit has interrupted the process, and/or the distance from the maximum allowed deviation and/or from the lower bound, and/or the number of times the time limit has already been extended, and/or other statistics and/or heuristics. (The decision is preferably made after making recommendations and asking permission from the user).
28 – The program that was running on the user's computer and/or the server, shows the user one or more acceptable offers (with or without disclosing at this stage the identity of the actual vendors) and ask him what he chooses, and according to the user's choices the server performs additional actions, if needed.

Fig. 3a

Here are the results of your optimization run for buying 5 books from 189 potential vendors.
These results were obtained after 45 seconds out of 60 seconds allowed. No special reductions were possible.

The Recommended offer for buying the 5 items you requested is:
Buy the books:

1. TITLE: Alternative Science: Challenging the Myths of the Scientific Establishment by **Author:** Richard Milton **ISBN:** 0892816317
Publisher: Inner Traditions International, Limited, **Publish Date:** 04/01/1996, **Binding:** Paperback , 272 pages, **List Price:** USD 16.95

2. TITLE: Shattering the Myths of Darwinism by **Author:** Richard Milton **ISBN:** 0892818840
Publisher: Inner Traditions International, Limited **Publish Date:** 03/01/2000 **Binding:** Paperback , 320 pages **List Price:** USD 16.95

From amazon.co.uk. Total cost: ($15.15 for item 1+ $15.15 for item 2+ $14 shipment by airmail) = $44.30.
Item 1 ships within 24 hours. Item 2 ships within 2-3 days. Airmail time: 7-10 days. Total estimated time: 9-13 days.

Buy the books:

1. TITLE: Cracking Creativity: The Secrets of Creative Genius by **Author:** Michael Michalko **ISBN:** 1580083110
Publisher: Ten Speed Press **Publish Date:** 03/01/2001 **Binding:** Paperback , 352 pages **List Price:** USD 19.95

2. TITLE: Creativity: Flow & the Psychology of Discovery & Invention by **Author:** Mihaly Csikszentmihalyi **ISBN:** 0060928204
Publisher: HarperTrade **Publish Date:** 06/01/1997 **Binding:** Paperback , 352 pages **List Price:** USD 15.00

From powell.com (2nd hand). Total cost: ($9 for item 1+ $5.25 for item 2+ $15 shipment by airmail) = $29.25.
Item 1 ships within 1-3 days. Item 2 ships within 2-3 days. Airmail time: up to 14 days. Total estimated time: up to 17 days.

Buy the book:

1. TITLE: Creative Breakthroughs: Tap the Power of Your Unconscious Mind by **Author:** Jill Morris **ISBN:** 0446392170
Publisher: Warner Books, Incorporated **Publish Date:** 03/01/1992 **Binding:** Paperback , 272 pages **List Price:** USD 15.95
eBook list price USD 9.95

As an eBook from powell.com. Total cost ($7.96 + 0 shipment) = $7.96. Estimate time: Instantly.
If you prefer to buy a hard-copy instead, Click here to view alternative offer.

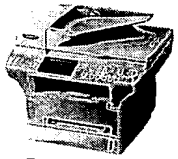
Estimate of the level of the result: Lower bound was: $75.35, Upper bound was $118.70, Maximum allowed deviation was $15. Acceptable offer is $81.51. Various statistics indicate that the obtained result is probably within 5% from the real optimal solution.

Fig. 3b

Here are the results of your optimization run for buying 8 computer-related items from 290 potential vendors. These results were obtained after 2.33 minutes out of 4 minutes allowed.

The Recommended offer for buying the 8 items you requested is:

Buy the items:



1. Brother MFC-9880 laser copier, printer, fax and color scanner. List price $940.20. Dimensions: With Carton (598mm width) x (567mm depth) x (580mm height) Without Carton (492mm width) x (456mm depth) x (429mm height). Weight With Carton 21.2 Kg Without Carton 17 Kg.

< Image> **2. ...**

From **amatteroffax.com**. Total Cost ($576.76 for item 1 + $340 for item 2 + $12 shipment to aggregation point by ground 2 days)=$934.76. This cost includes a reduction of 5% from original price on item no.2 allowed by pre-agreed rules, in order to prevent loss of item 2 to emscomputing.com.

Buy the items:

< Image> **1. ...**

< Image> **2. ...**

< Image> **3. ...**

< Image> **4. ...**

< Image> **5. ...**

from emscomputing.com. **Total cost (...) ...**

Buy the item:

< Image> **1. ...**

from PCNation. Total cost (...) ...

Since amatteroffax.com does not offer International orders at this stage, and since the shipment from emscomputing.com will cost $120 without the additional item from PCNation and $128 with it + $10 ground shipment to aggregation point, and separate International shipment from PCNation alone will cost $48, it is recommended to execute the order with our aggregation services. Giving up **amatteroffax.com** and our aggregation service will increase total cost by $152 to the next found acceptable offer. Total estimated shipment time is (3 days for ground shipment to aggregation point + 4 days for FedEX to Israel) = 7 days.

Estimate of the level of the result: Lower bound was: $2135.50, Upper bound was $2712.00, Maximum allowed deviation was $180. Acceptable offer is $2282.50 including $20 for aggregation service. Various statistics indicate that the obtained result is probably within 2% from the real optimal solution based on the single-items search data.